D. OFFICIAL DUTIES—1937-38.

Constitution of the Department.—The constitution of the Department is as under—

Chief Inspector of Mines and Explosives in Mysore ...	...	Mr. K. Duraiswamier, B.A., A.I.M.M.
Inspector of Mines (Ag.)	...	Mr. V. Narayana Rau, B.A.
Assistant Inspector of Mines (Ag.)	...	Mr. R. S. Batni, B.A., A.I.S.M.
Junior Inspector of Mines	...	Vacant.
Probationers	...	Messrs. S. R. Prasad, M.Sc. and M. Subramanyam, B.Sc. (Hons.)

Administration.—I continued to hold charge of the Department throughout the year and was confirmed in my appointment as Chief Inspector of Mines and Explosives in Mysore, with effect from 26th March 1938 by Government Order No. 148-49—C. B. 18-38-1, dated 13th July 1938.

Changes.—The following promotions of officers of the Department were ordered with effect from 26th March 1937, in Government Notification No. D. 2510—Geol. 30-37-2, dated 25th September 1937 :—

1. Mr. V. Narayana Rau, B.A. ... Assistant Inspector of Mines to act as Inspector of Mines
2. Mr. J. P. David, B.Sc. ... Junior Inspector of Mines, to act as Assistant Inspector of Mines.
3. Mr. R. S. Batni, B.A., A.I.S.M. Junior Inspector of Mines (*sub pro tem*) to act as Assistant Inspector of Mines, *vice* No. 2 on Foreign Service.

Loan of Services.—The loan of the services of Mr. J. P. David, Acting Assistant Inspector of Mines to Jaipur State for one year referred to in last year's report was extended, at the request of the Jaipur Government, by another two years in G. O. No. D. 8476-77—Geol. 77-37-2, dated 4th May 1938.

Probationers.—Government were pleased to appoint Messrs. S. R. Prasad, M.Sc. and M. Subramanyam, B.Sc. (Hons.) as Probationers for two years in their Order No. D. 4231-33—Geol. 58-36-7, dated 10th December 1937 and they reported themselves for duty on 3rd January 1938 and have been undergoing training since.

Office Inspection.

The annual inspection of the office was carried out in May 1938 and everything was found to be in order.

Statistics of Business.

During the year 3,146 letters were received and 2,790 despatched, compared with 3,157 and 3,093 respectively in the previous year.

Stores and Stock-taking.

The stock registers relating to furniture, library and other articles have been written up-to-date. These were checked as required by Codal Rules and found correct.

Inspection of Mines—Kolar Gold Field.

The inspection of Mines on the Kolar Gold Field entails great physical strain under extremely trying conditions owing to the increasing depths of these Mines—the deepest working point being 8,290 ft. vertically below field datum in the Ooregum Mine. All the Mines were systematically inspected during the year and many special inspections have been carried out both on surface and underground in

connection with accidents. There were no serious defects or lapses of the Mining Rules noticed during these inspections and the Mining authorities have always been ready and willing to rectify immediately any defects brought to their notice.

In addition to the investigation of all fatal and serious accidents, enquiries were held into those classed as trivial or non-mining in which breach of the Mining rules had or suspected to have taken place. As a result of these enquiries the persons responsible were suitably punished.

Examination of Candidates for Certificates under the Mining Rules.

Under Rules 15 and 16, Mysore Mining Rules, examinations for the grant of certificates of mestris, blasters and engine drivers are conducted by the Department once a week. In all 903 candidates were examined during the year.

The following statement shows the number of candidates examined and certificates issued up to the end of June 1938:—

Year	Mestris		Blasters		Engine Drivers			
					First Class		Second Class	
	Number examined	Number passed	Number examined	Number passed	Number examined	Number passed	Number examined	Number passed
Total up to the end of June 1937.	15,470	15,202	10,294	9,509	495	495	498	498
For 1937-38 ...	533	533	255	203	20	20	95 (a)	95 (a)
Total up to the end of June 1938.	16,003	15,735	10,549	9,712	515	515	593	593

(a) Includes 5 loco drivers.

On application and after verification 25 duplicate tickets (discs) were issued to mestris who had lost the originals.

The fees realised during the year from candidates who appeared for the above examinations, issue of duplicate discs and fees levied for testing lightning conductors attached to Explosives Magazines and Petroleum Installations, etc., amounted to Rs. 3,626-9-6 as against Rs. 3,069-13-3 in the previous year.

Inspection of Mining Accounts.

In pursuance of the Standing Orders of Government the annual inspection of the accounts of one of the Gold Mining Companies, *viz.*, the Nundydroog Mines, Limited was carried out on the 25th July 1938 by the Comptroller to Government in association with the Chief Inspector of Mines and Explosives in Mysore. The registers and other accounts pertaining to the production of gold for the months of July and December 1937 were examined and found to agree. The corresponding entries in the cash book in respect of the amounts realised by the sale of gold produced in these months were also checked and found to be correct. The vouchers and other documents in support of the charges in the Royalty returns were verified with the original communications of the Mint Master and the National Bank of India, Limited, Bombay, with their copies received in the Comptroller's Office and everything was found to be in order.

The Resident Auditor, Messrs. John Taylor & Sons' Committee and the Company's Accountant rendered necessary assistance in carrying out the test audit.

Inspection of Mines—Outside Kolar Gold Field.

The following Mining Blocks outside the Kolar Gold Field were inspected during the year :—

Mysore District.—				
Shinduvalli	...	Chrome	...	Mining Lease No. 147.
Talur	...	Do	...	Government area.
Urdabur	...	Do	...	Do
Dodkanya	...	Magnesite	...	Mining Lease No. 150.
Hassan District.—				
Pensamudra	...	Chrome	...	Mining Lease No. 174.
Sunkadahalli	...	Do	...	Do 172.
Bhaktharhalli	...	Do	...	Do 158.
Byrapur	...	Do	...	Government area.
Chikkonahalli	...	Do	...	Mining Lease No. 159.
Jambur	...	Do	...	Do 160.
Kadur District.—				
Kemmangundi	...	Iron	...	Government area.
Shimoga District.—				
Bhadigund	...	Limestone	...	Government area.
Chitaldrug District.—				
Keshapur	...	Manganese	...	Mining Lease No. 176.
Mahadevapur	...	Do	...	Do 173.
Kolar District.—				
Manighatta	...	Gold	...	Special Prospecting License.

Except Sinduvalli Mine in Mysore District all the others are worked on the "open cast" system. No serious lapses of the Mining Rules were noticed during these inspections.

Shinduvalli Mine.—This mine which has attained a vertical depth of 492 ft. below surface produced during the calendar year 1937, 10,196 tons of chrome ore. Development work carried out in the bottom levels of the mine exposed a reef 9" wide but further exploratory work had to be temporarily suspended on account of the influx of water.

Concentration Plant.—Arrangements to instal a tube mill and four concentrating tables in open circuit to concentrate the powdery ore mixed with "kharab" (waste) lying near the several shafts, were completed towards the end of the year. The plant is proposed to be worked by a 75 H. P. electric motor. It is expected to produce a daily output of 15 to 20 tons of concentrates containing 51 per cent Cr_2O_3.

Keshapur Mine.—This mine, which is worked on the opencast system produced during the year 1,012 tons of manganese ore.

Concentration Plant.—As mentioned in last year's report this plant consisting of two wilfley tables, a mechanical screen, a pump and a jaw crusher started operations towards the end of the year. After producing a small quantity of 30 mesh pyrolusite averaging 85% Mn G_2 the operation of the plant has been suspended temporarily.

Base Minerals.

Of the base Minerals produced in the State, the most important ores are Chromite, Manganese and Iron Ores. Exports of Chrome and Manganese ores showed an increase on account of favourable foreign market conditions. The demand for Chrome remained more or less steady during the year, but sudden variations characterised the market conditions for mangenese.

The Mysore Iron and Steel Works mined as usual large quantities of iron ore and limestone for their own use.

The following table shows the production in short tons of the important base minerals during the years 1936 and 1937 :—

	1936 Tons	1937 Tons
Manganese	1,801·63	6,213·85
Chromite	23,906·07	29,567·96
Magnesite	2,801·85	2,667·06
Kaolin	2,805·95	4,718·42
Dolomite	3,454·08	3,693·76
Iron Ore	46,969·44	36,377·60
Limestone	2,991·52	7,029·12
Graphite	169·12	358·96

Further details regarding base minerals are found in Table 4 appended to this report.

II. Labour Employed.

The total number of persons employed in the Mining Industry in 1937 was 26,666 as against 24,581 in the previous year.

Of this number, 24,239 were employed in gold mining against 22,973 in 1936; 620 on manganese against 174; 1,102 on chrome against 1,051; 195 on iron ore against 195; 30 on dolomite against 30; 131 on kaolin against 16; 20 on mica against 4; 4 on slatestone against 7; 28 on felspar against 23; 60 on limestone against 44; 27 on soapstone against 17; 16 on quartzite against 26; 61 on crude graphite against 24; 110 on magnesite, 19 on Hiriyur slabs and 4 on copper.

Of the 24,239 persons employed in gold mining, 345 were Europeans, 541 Anglo-Indians and 23,353 Indians, a total of 15, 486 being employed below ground and 8,753 on surface. Of the latter, 984 were women and 192 children under 12 years of age.

There was no change in the general working hours underground or on surface.

The following statement gives the average number of hours worked and the average earnings per person per week in 1937 in respect of labour employed by the gold mining companies and their allied departments on the Kolar Gold Field :—

Average number of hours worked per person per week		Average weekly earnings per person	
Underground	Surface	Skilled	Unskilled
47	56	Rs. a. p. 8 2 2	Rs. a. p. 3 12 0

Except for two strikes of an insignificant nature in Nundydroog Mine which terminated on the same day, the relationship between the employer and the employed has been cordial and no shortage of labour has been felt at any time.

Health and Welfare.

Improvement of the living conditions and the provision of social amenities for the workmen are being attended to by the Central and Branch Welfare Committees assisted by a Special Welfare Officer. The old huts are being gradually replaced by larger ones and concrete houses are being built in one mine as these structures are more conducive to cleanliness. The cooly lines are getting cleaner every year and the workmen have begun to realise the beneficial effects of sanitary surroundings. The cattle owned by the workmen are housed in separate sheds away from their dwellings with the result that the cooly lines appear cleaner.

Night schools continued to work satisfactorily during the year in addition to the usual day schools in the lines. Drama Halls built in the lines are made use of by the workmen for amateur acting and performances are given almost every

Saturday night. The travelling cinema is very popular and lantern lectures on Health, Hygiene and Temperance are given. The establishment of maternity homes in charge of qualified midwives has been a great benefit and all confinements now take place in these clinics.

The Scout movement is very popular among the younger workmen and their assistance at Sports, Receptions, etc. is of great value. Playgrounds and Parks continue to be used with enthusiasm.

As usual the annual Inter Mine Sports were held on the 5th of March 1938 and the shield presented by Mrs. Sydney Taylor was won by the Nundydroog Mine. The hand-drilling competition which was one of the events attracted a large number of competitors.

It is pleasing to be able to record that the Welfare work which is being carried on for the last few years has resulted in improving the living conditions of the workmen who have begun to appreciate the benefits of clean and healthy surroundings.

Rescue Station.

The following notes kindly furnished by Messrs. John Taylor & Sons' Committee on the organisation and working of the Rescue Station on the Kolar Gold Field will be of interest:—

A Central Mine Rescue Station has been established on the Kolar Gold Field, since the year 1923, for the purpose of training selected employees of all classes in the use of oxygen breathing apparatus and gas masks. The services of the Rescue Station are available for employment in a fire emergency for the rescue of gassed or trapped men and for fire-fighting and recovery work.

The Station is centrally situated near the Oorgaum Railway Station and is equipped with 58 sets of Proto oxygen-breathing apparatus and a number of Burrell and Puretha gas masks. A specially equipped motor lorry is housed in the Station and is always loaded with 22 fully charged Proto sets and six Burrell or Puretha masks together with refilling materials and necessary gear. This lorry can deliver rescue apparatus to the most distant shaft in 15 minutes at most. The lorry also carries 1,000 feet of hose pipe in lengths of 50 feet.

Two Eve-Riley rocking stretchers are kept at the Rescue Station for the resuscitation of men affected by gas poisoning. Two sets of Novita reviving apparatus and one 'Sparklet' Co_2 Resuscitator are carried on the lorry.

The organisation is controlled by Messrs. John Taylor & Sons' Committee and is under the direction of an Officer-in-charge. A chargeman and his staff reside at the Station and are always on duty in case of emergency.

The non-resident trained Rescue men number 145 and are drawn from the European, Anglo-Indian and Indian members of the underground staff of the four mines on the Field. Every man is practised monthly at the Station and quarterly underground. A history card is maintained for each trained man giving particulars of his service, attainments and the number of practices performed annually. Deputy Officers drawn from the Senior European trained men are appointed on each mine to regulate the training under the Officer-in-charge and assume control at a fire emergency until the arrival of the Officer-in-charge who is primarily responsible or the conduct of fire-fighting operations.

The Proto oxygen-breathing apparatus with which the Station is equipped is fentirely self-contained and enables the wearer to work in a lethal atmosphere for periods up to two hours without recharging. The Burrell or Puretha mask is an apparatus used in early reconnaissance and affords protection against carbon monoxide, but cannot be used in an atmosphere deficient in oxygen. Masks are installed at all underground hoist chambers and winches for the protection of drivers who can thereby continue to work essential hoists during an emergency. These masks are the property of the mine concerned.

An aviary is maintained and stocked with small local birds. These birds are intended for use as gas detectors, but it has been found that with the great depth and high temperatures obtaining in the mines on the Kolar Gold Field they are unsuitable in the majority of cases and reliance cannot generally be placed on their behaviour.

Ventilation sections of the mines are posted at the Rescue Station and the trained rescue men are instructed in the systems in force at their mines and the measures to be adopted in a fire emergency.

A fire engine mounted on wheels and capable of being towed behind the rescue lorry is housed at the Station and is available for combating surface fires.

Safety First and Accident Prevention.

The several methods that were set on foot last year to educate the ignorant labourer have resulted in an appreciable decrease in the trivial accidents which were mostly due to individual carelessness. The use of hats and trousers is compulsory and nobody is allowed underground without a lamp. The "Safety-first" posters which are illuminated during the night attract the workmen on the shaft tops. The attendance at lecture halls, where models of shafts, levels, stopes, etc., are displayed has largely increased and the ordinary workman has begun to take a keen interest in all these activities, which are being carried on with the main object of reducing accidents. Searching enquiries are held into all serious and fatal accidents, and the persons responsible are given deterrent punishments. In addition systematic inspection of all the mine workings are made to enforce the mining rules.

It is pleasing to be able to state here that the death rate of 1·93 per thousand for the year under report, is the lowest on record since 1908.

As usual, a large number of Europeans, Anglo-Indians and Indians were trained in the "First-Aid" work by holding regular classes and examinations.

III. Accidents.

(*a*) Statistics for the year 1937.

The total number of accidents reported during the year 1937 was 223 against 244 in the previous year.

Of these accidents—

	42 were fatal,
	176 serious, and
	5 non-mining.
Total ...	223

The total number of fatal and serious accidents excluding non-mining cases, was therefore 218 which works out at the rate of 8·18 per 1,000 persons employed as against 9·76 in the previous year.

Enquiries were instituted into all the accidents reported to this Department and inspections were also made in connection with accidents of more than ordinary importance.

Of the above 218 accidents—

21 or 9·63 per cent were due to negligence,
18 or 8·26 per cent were due to recklessness,
179 or 82·11 per cent were classed as unavoidable.

The corresponding figures for the year 1936 were—

23 or 9·58 per cent due to negligence,
17 or 7·08 per cent due to recklessness, and
200 or 83·34 per cent were classed as unavoidable.

In the 42 fatal accidents, 49 persons were either killed or died as a result of injuries received, giving a mortality of 1·84 per 1,000 persons employed against a mortality of 2·44 during the year 1936.

The death rate in the gold mines which as usual employed the largest number was 1·93 per 1,000 against 2·57 in 1936.

The following Chart III shows the total number of persons killed in accidents and death rate per 1,000 persons employed in the mines on the Kolar Gold Field during the years 1906 to 1937. The average death rate for the whole period is 3·08 per thousand and the rate for the year under report is 1·93 which is the lowest on record for the last 30 years.

Of the 42 fatal accidents in 1937—

22 or 52·38 per cent were unavoidable,
4 or 9·52 per cent were due to recklessness, and
16 or 38·10 per cent were due to negligence.

There were five individual accidents involving two or more fatalities, one of these occurring at Mysore, two at Champion Reef, one at Ooregum and one in Nundydroog.

In the 13 separate accidents due to rockbursts, 19 persons were killed, compared with 11 and 20, respectively in the previous year. Of the above accidents, one took place at Mysore, five at Champion Reef, three in Ooregum and four at Nundydroog.

Seven fatal accidents due to explosives occurred underground involving the death of seven persons against seven and eleven respectively, in the previous year.

Falling away in shafts, winzes and stopes accounted for 14 fatalities in 14 accidents against the same number of accidents and deaths, respectively, in the previous year.

Classification of accidents in 1937.

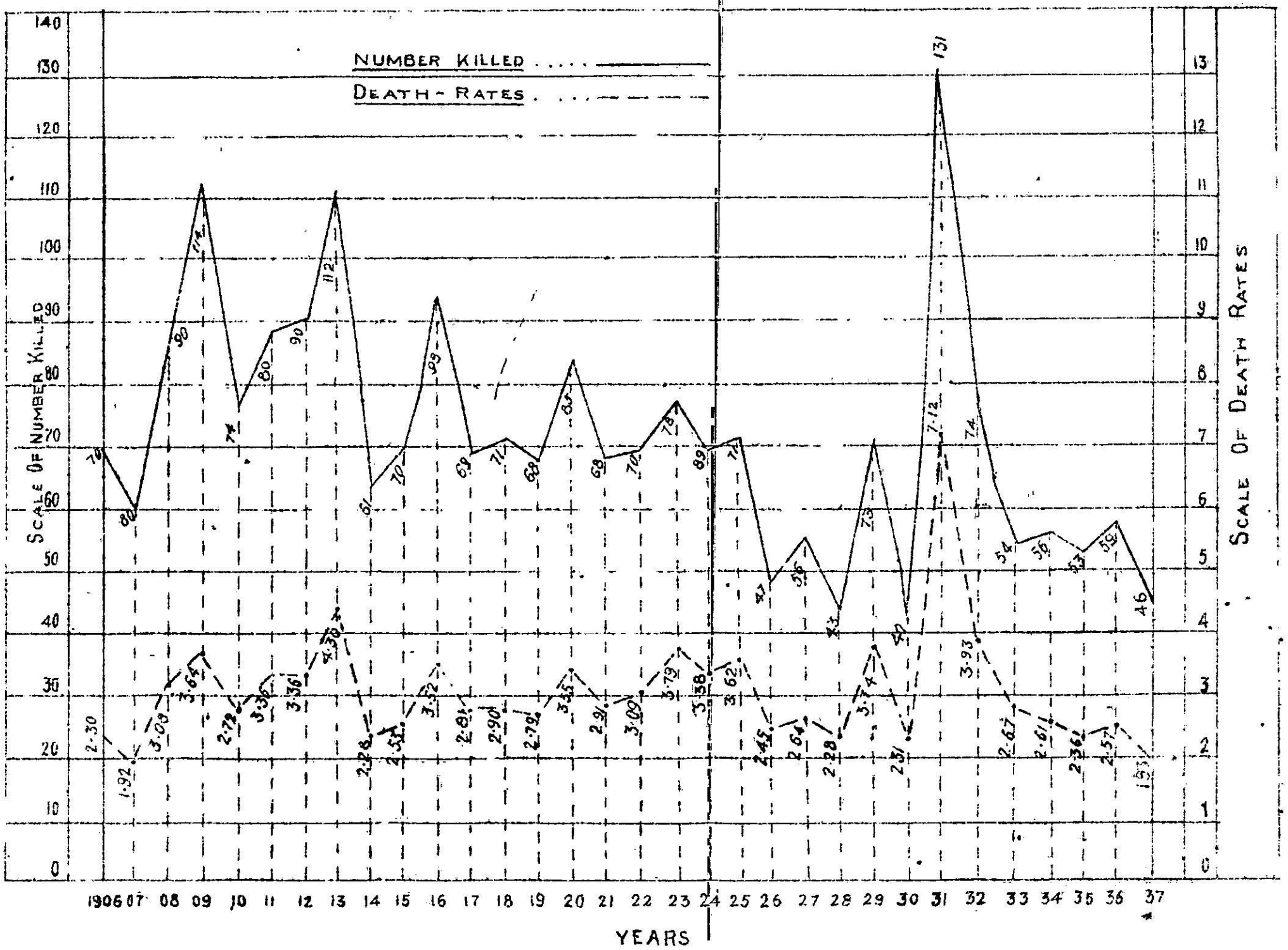
		Fatal accidents	Non-fatal accidents	Deaths	Serious injuries
1	Rockbursts	13	30	19	51
2.	Falls of ground	1	1	1	1
3.	Falling in shafts, stopes, etc	13	12	13	13
4.	Explosives (misfires, etc.)	9	5	10	15
5.	Trucks and Tramways	2	17	2	17
6.	Run over or struck by skips or cages, etc. ...	..	4	...	4
7.	Hoisting	...	...	...	...
8.	Other machinery	...	6	...	6
9.	Falls of rock and materials in shafts, stopes, etc.	1	5	1	6
10.	Ropes and chains breaking	...	...	...	...
11.	Other causes	3	96	3	96
	Total ...	42	176	49	209

Chart IV (on the next page) shows the curves of accident and death rate per 1,000 persons employed underground in the Kolar Gold Mines. It is gratifying to note that the curve for the total number of men involved in accidents has been showing a steady decline from the year 1934 onwards. The rate curves for accidents and serious injuries also show the same tendency to improvement. The curve for death rate which reached the peak in 1931 as a result of an unprecedented fire in Nundydroog Mine when 53 lives were lost, reached the lowest point since 1915 in the year under report. This gradual reduction in the accident and death rates is primarily attributable to the active safety-first campaign which has begun to s imulate the safety sense of the workmen.

KOLAR GOLD FIELD

TOTAL NUMBER KILLED BY ACCICENTS AND ACCIDEN DEATH RATES PER 1,000 PERSONS IN SERVICE PER ANNUM

CHART III

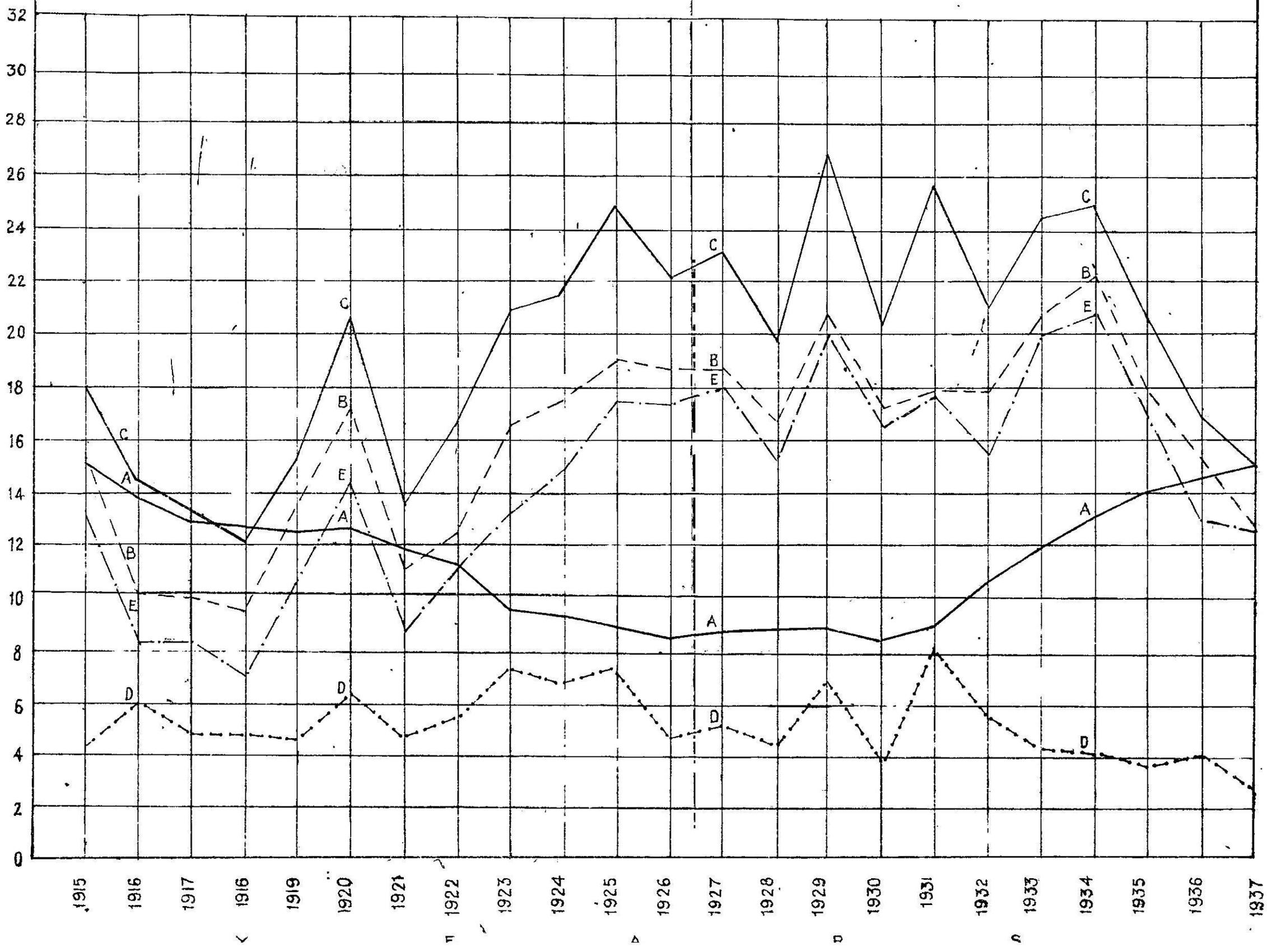


KULAR GOLD FIELD

UNDERGROUND ACCIDENTS

Chart IV.

A. UNDERGROUND LABOUR. 1000's
B. ACCIDENTS PER 1000
C. MEN INVOLVED IN ACCIDENTS PER 1000
D. MEN KILLED PER 1000
E. MEN SERIOUSLY INJURED PER 1000



Non-casualty Accidents reported under Rule 165 of the Mysore Mining Rules.

There were twelve accidents reported under this head caused as follows :—

1.	Engine running out of control	1
2.	Fracture of essential part of winding engine, crank shaft, couplings, gearings, clutch drum or drum shafts ...	1
3.	Fracture of winding rope or its attachments to skip, cage or drum	...
4.	Fracture of pit-head sheave or axle	...
5.	Failure of efficiency of brake	...
6.	Failure of safety catch to act when required	...
7.	Failure of device for prevention of over-winding or of detaching hook to act when required	...
8.	Overwinding of cage or skip	10
9.	Bursting of anything containing steam, compressed air or other substance at high pressure	...
	Total ...	12

Of these 12 accidents reported during the year, 10 were due to overwinding of the cage or skip, one was due to the fracture of drum shaft inside the drum boss of a winding engine and the other owing to an engine running out of control. Eleven of these accidents were due to the carelessness of drivers against whom necessary action was taken; three of them were severely reprimanded and warned as first offenders, while five were fined, the amount of fine ranging from Rs. 5 to Rs. 10; two drivers were suspended from working for six and seven days, respectively, and the certificate of the driver concerned in another case was suspended 'sine-die'.

(b) Compensation for Fatal and Serious Accidents in Mines on the Kolar Gold Field for the year 1937-38.

During the year 126 claims for compensation comprising 53 fatal, 3 permanent total disablement and 70 permanent partial disablement, arose from accidents in the mines on the Kolar Gold Field and the compensation awarded under all the above heads amounted to Rs. 70,986 as against Rs. 69,658 paid in the previous year. Besides the above, compensation amounting to Rs. 29,088 was paid in cases of temporary disablement in pursuance of Section 4 (*d*) of the Workmen's Compensation Act as against Rs. 18,194 paid in the preceding year.

An extract from the report of the Commissioner on the administration of the Workmen's Compensation Act on the Kolar Gold Field during 1937-38 is published in Appendix I of this Report.

The following statement shows the number of fatalities permanent and temporary disablements and compensation paid by the mines working on the Kolar Gold Field during the year ended 30th June 1938 :—

Name of Mine	Number of cases (a)				Compensation paid (b)				
	Fatalities	Permanent Total Disablement	Permanent Partial Disablement	Temporary Disablement	Fatalities	Permanent Total Disablement	Permanent Partial Disablement	Temporary Disablement	Total
					Rs.	Rs.	Rs.	Rs.	Rs.
Mysore ...	13	...	13	728	9,520	...	4,706	5,765	19,991
Champion Reef ...	10	...	23	725	7,010	...	6,349	7,832	21,191
Ooregum ...	16	2	10	531	10,055	1,470	5,235	6,176	22,936
Nundydroog ...	13	1	24	1,164	9,340	1,932	11,617	9,253	32,142
Allied Departments	1	...	...	9	3,500	...	252	62	3,814
Total ...	53	3	70	3,157	39,425	3,402	28,159	29,088	1,00,074

(a) Number of cases relates only to those accidents which occurred during the period from 1st July 1937 to 30th June 1938.

(b) Compensation paid relates to payments made during the period from 1st July 1937 to 30th June 1938, but this includes payments in respect of accidents previous to 1st July 1937 also.

The following amounts were paid as compensation in the previous years :—

	Total amount of compensation paid. Rs. a. p.
1932-33	71,900 12 0
1933-34	79,454 12 0
1934-35	85,658 0 0
1935-36	1,10,769 0 0
1936-37	87,852 0 0

Miners' Phthisis.

Special Rules in pursuance of sub-section 2-A of Section 3 (amended) of the Workmen's Compensation Act, for the medical examination of workmen and autopsy on the bodies of deceased workmen, referred to in the last year's report have since been framed and the sanction of Government is being awaited to bring them into force.

Notes on important Accidents during the official year 1937-38.

There were 7 accidents in which two or more lives were lost resulting in 24 deaths as compared with two accidents and nine fatalities during the previous official year. Of these, four rockbursts were responsible for 15 deaths, four lives were lost in a single explosive accident and the remaining five deaths were due to two miscellaneous accidents in which two and three persons died respectively.

Cause	Number of accidents	Number of fatalities
Unavoidable	4	15
Negligence	2	6
Recklessness	1	3
Total ...	7	24

Rockbursts.

Though there was an increase in the total number of fatalities it is seen from the seismographic records of the year that there has been actually a decrease in the intensity and frequency of the heavy type of rockbursts which were causing considerable damage to person and property. This was due to the much improved methods of supporting excavations rigidly, such as granite masonry or dry packing of stopes, concrete arching or steel setting of levels and concrete or brick lining of shafts. In spite of all these precautions ten accidents involving 21 fatalities occurred during the year. Of the 21 deaths, two or more lives were lost in four accidents accounting for 15 deaths and in all the other accidents only single fatalities occurred. In two accidents in the Ooregum Mine 11 lives were lost, seven in one and four in the other, as a result of a series of very heavy rockbursts. Rockbursts still continue to contribute a large percentage to the total death rate.

Accident No. 32 of 1938.—This most unfortunate accident in which seven lives were lost occurred in a remnant which was being worked by hand labour. About the end of the morning shift on the 19th February 1938, while four pairs of handjumper coolies were drilling holes in a stope below the 55th level S., Oakley's No. 2 Vertical Shaft, a series of very heavy rockbursts occurred resulting in six of them being completely entombed in the debris and two seriously injured, one of the latter dying later in hospital making a total of seven deaths in all. This block of ground between the 55th and the 56th levels, a depth of 100 feet, was gradually taken out in small lengths by underhand stoping and the excavation was systematically supported with pigstyes which were kept as close to the working face as practicable, allowing only sufficient room for the workmen to drill holes. On the

day of the accident, the size of the remnant was 45′ × 20′ with an average width of 3 feet. The levels above and below this stope had been secured with steel sets and the worked out areas all round it had been Secured with pigstyes or granite packs and the intervening spaces filled in with waste rock. This was the only stope that was being worked in this area at the time and the damage was confined to this single working place. The level immediately below the pillar suffered the most. One of the steel sets supporting the level below the pillar had been fractured while four of them had been twisted, one taking the shape of an S. The working face had been filled up with debris throughout its length for a thickness of four feet. The lamps and jumpers which had been thrown up by the violent burst were found on top of the debris. The hanging and footwalls between the working face and the last line of supports had been shattered and the footwall had been displaced for a thickness of four feet. The remnant itself had been crushed and all sides shattered. But for the steel sets which effectively withstood the violent ground movements, the 56th level would have been closed up and rescue work greatly hampered. Steel sets which consist of two semi-circular or oval pieces of 75 lb. section rails held in position by shoes or rectangular steel boxes at the top and bottom have proved to be very effective in keeping the levels open even in zones of great pressure.

Accident No. 197 of 1937.—An extraordinarily heavy rockburst followed by others of lesser intensity occurred on 22nd October 1937, which violently shook all the buildings on the Kolar Gold Field. The vibrations were felt even in places more than 18 miles away from the Field. The Champion Reef and the Ooregum Mines were affected and the damage to persons and property was greatest in the latter mine. This burst occurred at a time when the full morning shift was at work in both the mines but fortunately only seven people were injured in the Champion Reef Mine while the damage to underground workings was extensive in the Ooregum Mine and four persons were killed and four others seriously injured.

The central portion of the Ooregum Mine between the two main secondary shafts had been severely damaged between the 57th and 70th levels. This zone which has been intensively stoped is traversed by a number of dip-faults and a 120 feet wide dyke runs just south of it. The deepest working point of the mine was 8,000 feet below surface and all the damage was confined to the levels above 7,000 feet. Except for a few falls of rock, the stopes were not in the least affected but the levels suffered the most and all the casualties occurred there.

A number of timber sets and runners were damaged in Oakley's No. 2 Vertical Shaft which lies in the centre of this disturbed zone, making it impossible to move the cages. Similarly the cage roads below the 64th level, Auxiliary Shaft, had also been damaged. Portions of levels between the 57th and 70th levels had been choked and the bottom of one level had been lifted up for a considerable distance and the steel sets had been bent. The damage was greatest at the 66th level which was in the centre of the zone of maximum intensity.

All the stopes had been systematically supported with granite packs and levels secured with steel sets which were able to withstand sudden ground movements and keep the levels which would otherwise have been closed in. But for these steel sets, the damage to person and property would have been much greater.

The intensity of this burst that started a number of ground movements in quick succession was so great that all the three styles of the seismograph were thrown off. It will be seen from the following record of the movements that equilibrium was not restored until after three hours of the initial disturbance :—

Time	N—S	E—W	Vertical
9 Hours 38′00 Mts.	Style off	Style off Re-set 11 minutes later	Style off
9 do 52′60 do	0.1 m/m	0′5 m/m	1′0 m/m
9 do 56′75 do	2.3 do	2′2 do	1′2 do
9 do 58′36 do	0.8 do	0′9 do	1′0 do
9 do 59′73 do	0.1 do	0′4 do	0′1 do

Time	N—S	E—W	Veritical
10 Hours 1·85 Mts.	0·9 m/m	1·3 m/m	0·4 m/m
10 do 15·23 do	0·4 do	0·8 do	0·1 do
10 do 23·73 do	0·4 do	1·0 do	0·1 do
10 do 25·38 do	1·8 do	1·7 do	0·1 do
10 do 25·41 do	3·4 do	2·9 do	2·0 do
10 do 42·18 do	.....	0·4 do	... ..
11 do 12·28 do	8·6 do	8·3 do	2·2 do
11 do 12·38 do	0·1 do	0·3 do	0·3 do
11 do 33·73 do	0·1 do	0·5 do	0·1 do
11 do 55·00 do	2·7 do	1·5 do	2·0 do
12 do 14·00 do	2·0 do	2·6 do	2·3 do

Explosives.

Accident No. 67 of 1938.—The worst explosive accident of the year in which four lives were lost occurred in a driving end at the 88th level N. Edgar's Sub-Vertical Shaft, Mysore Gold Mine. During the morning shift on 24th May 1938 two climax Imperial Drills mounted on a single bar were being used for boring holes and while the 6th hole was being drilled one of the drills intersected an old hole and caused an explosion. Two machine men were killed instantaneously and two others died later in hospital. As this was an avoidable accident which could have been prevented with due care, action was taken against the persons responsible for the safe conduct of work and they were convicted and fined.

There were four other accidents in which a single life was lost in each case and of these three were due to deepening old sockets and one was due to a certified blaster being caught in the blast while he was igniting the fuses.

In spite of the lectures and safety first propaganda, accidents from this cause continue to occur. There were five accidents involving 8 fatalities during the year as against the same number of accidents and five deaths during the previous year, the increase of 3 deaths being due to the loss of four lives in the single accident described above.

Falling in Shafts, Winzes, Stopes, Etc.

There were 11 accidents involving 11 deaths as against 13 accidents and 13 deaths in the previous year. Though there has been a slight decrease in the total number of fatalities, yet, accidents from this cause would not have occurred if the individuals concerned had taken due care in carrying out the work entrusted to them. Two persons fell down Vertical Shafts from the plats while they were in the act of getting into a cage which was suddenly moved. An electric fitter fell down a steeply inclined shaft while getting into a cage from the plat as he failed to use the safety door to step on to enter the cage. A trammer while walking along the level without a light stepped into an open winze and was killed. A hoisting cooly while riding up on the edge of a skip overbalanced into the shaft.

The others lost their lives by falling in stopes or winzes from ladders or stages. In one accident three machine men lost their lives by falling down a rill stope owing to the collapse of the stage on which they were working. The collapse of the stage was attributable to the failure of a bed-piece owing to a large accumulation of broken ore on the stage, and the persons responsible for the safe conduct of work in this stope were suitably punished.

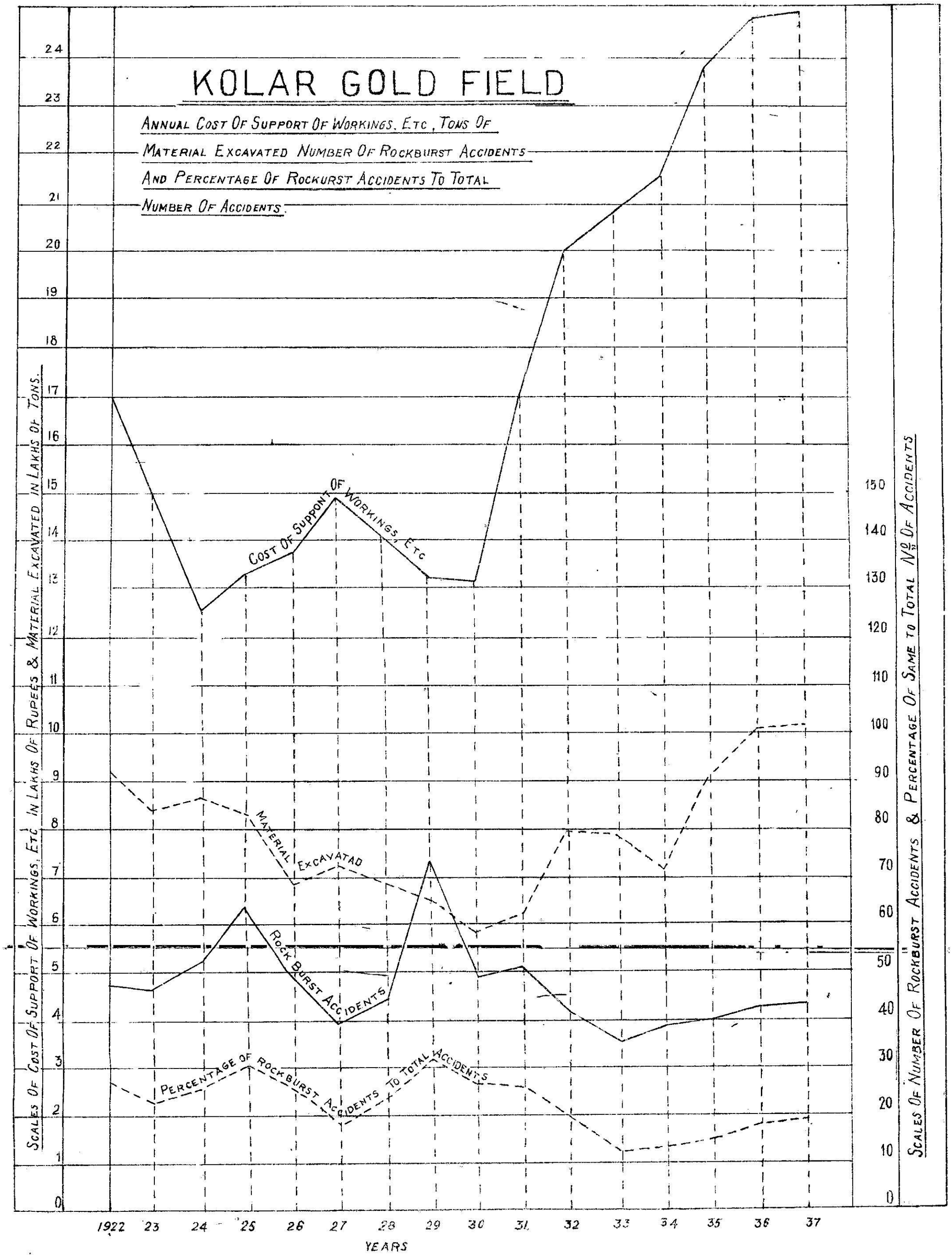
Miscellaneous.

Two surface coolies were suffocated to death as they were caught in the debris resulting from the collapse of a side of a foundation for an engine house on surface near Gifford Shaft, Champion Reef Mine. The length of the foundation trench was 70 ft. and the width 6 ft. and one side was 14'-6" high while the other side was 9'-3". While the bottom of the foundation was being cleared by 12 coolies, the top of the higher side suddenly collapsed and buried two of them. The sudden fall of

CHART V

KOLAR GOLD FIELD

ANNUAL COST OF SUPPORT OF WORKINGS, ETC, TONS OF MATERIAL EXCAVATED NUMBER OF ROCKBURST ACCIDENTS AND PERCENTAGE OF ROCKURST ACCIDENTS TO TOTAL NUMBER OF ACCIDENTS.


COST OF SUPPORT OF WORKINGS, ETC
MATERIAL EXCAVATAD
ROCK BURST ACCIDENTS
PERCENTAGE OF ROCKBURST ACCIDENTS TO TOTAL ACCIDENTS
SCALES OF COST OF SUPPORT OF WORKINGS, ETC IN LAKHS OF RUPEES & MATERIAL EXCAVATED IN LAKHS OF TONS.
SCALES OF NUMBER OF ROCKBURST ACCIDENTS & PERCENTAGE OF SAME TO TOTAL NO OF ACCIDENTS
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
1922 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37
YEARS

the side was due to the effect of the heavy rain which fell two days before, resulting in rain water seeping through soft clay overburden into a fissure behind the west side causing the overburden to slip down a smooth joint plane. The overburden had been cut back and the side sloped and a few props fixed in the foundation. The exposed face showed a smooth concave joint plane for a length of 30 ft. and the ground that fell consisted of decomposed hornblende schist and soft gravelly clay. The Chief Engineer had inspected the foundation a few minutes before the accident and there were no indications of an impending collapse as no trace of the fissure or any crack was noticeable in the foundation.

The accompanying graph Chart V, shows the gradual increase in the cost of support of workings as compared with the material excavated. It will be seen therefrom that the cost of support of workings rose from Rs. 13,10,014 in 1930 to Rs. 24,99,565 in 1937, whereas the increase in materials excavated during the same period was from 580,228 tons to 1,014,542 tons.

Cases of Neglected Injuries.

During the year there were 19 cases of neglected injuries compared with 17 in the preceding year, which though trivial at the time of occurrence became serious owing to delay on the part of the persons concerned in seeking timely medical aid. The total number of neglected mining accident cases, both serious and trivial, treated in the Kolar Gold Field Mines' Hospital was 712 as against 694 in the previous year showing an increase of 18. Action is being taken to educate the workmen by means of lectures advising them to seek immediate medical aid even in cases of trivial injuries.

The following statement shows the cases of neglected injuries treated in the Companies' Hospital:—

Name of Mine	January		February		March		April		May		June		July	
	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial
Mysore	...	20	1	21	2	18	3	29	1	17	...	18	1	29
Champion Reef	1	10	...	11	1	8	...	8	...	9	...	5	...	3
Ooregum	...	11	...	5	...	5	...	6	...	7	...	9	...	8
Nundydroog	1	19	1	17	1	16	...	17	1	10	1	15	..	17
Total ...	2	60	2	54	4	47	3	60	2	43	1	47	1	57

Name of Mine	August		September		October		November		December		Total	
	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial	Serious	Trivial
Mysore	...	23	1	21	...	27	...	31	...	19	9	273
Champion Reef	...	7	1	12	1	11	...	10	...	11	4	105
Ooregum	...	6	...	3	...	9	...	13	1	7	1	89
Nundydroog	...	33	...	20	...	17	1	22	...	23	6	226
Total ...	...	69	2	56	1	64	1	76	1	60	20	693

IV. Meteorology and Seismology on the Kolar Gold Field.

The following has been taken from the report for the year 1937 by Mr. H. A. Martin, Officer-in-charge of the Kolar Gold Field Observatory, which was kindly furnished to this Department by Messrs. John Taylor and Sons' Committee, Oorgaum.

Meteorology.

Observations were regularly taken throughout the year at 8, 10 and 16 hours and the results tabulated.

Temperatures.—The highest dry and wet bulb temperatures recorded during the year were 99·2°F. and 76·0°F. respectively, while the lowest were 52·7° F. and 49·0°F., respectively. The mean dry bulb temperature for the year (75·7°F.) was only 0·1°F. above the normal while the mean wet bulb temperature (66·7°F.) was 1·0°F. above the normal.

Rainfall.—The rainfall for the year was 41·13 inches being 10·03 inches above normal and the greatest annual rainfall for a period of eighteen consecutive years.

SEISMOMETRY.

The installation was maintained in continuous operation throughout the year and instrumental failures were few.

Classification of Rockbursts.—The same classification as in previous years has been continued and the following table gives the total number of bursts recorded during the year :—

Displacement in Millimetres	Number of Rockbursts		
	1937	Normal (Mean)	Departure
Less than 1·0	2,878	2,320	+558
Between 1·0—2·0	406	442	—36
Between 2·0—3·0	89	149	—60
Between 3·0—10·0	94	98	—4
Between 10·0—20·0	2	4	—2
Over 20·0	1	4	—3
Those in which one or more styles were thrown off.	7	5	+2
Total ...	3,477	3,022	+455

From the foregoing table it is clear that during 1937 "Minor" bursts have shown a definite increase while "Medium" bursts have distinctly decreased.

The following table shows the total number of bursts of 1 m/m. displacement and upwards during the years of observation:—

Year	Total	Year	Total
1917	90	1928	295
1918	106	1929	446
1919	132	1930	693
1920	253	1931	675
1921	322	1932	564
1922	303	1933	830
1923	282	1934	667
1924	328	1935	1,065
1925	445	1936	786
1926	337	1937	599
1927	341		

Average for 1917 to 1937 = 455.

Excess over average in 1937 = 144.

Earthquakes and Tremors.—The following table gives the number of disturbances of seismic origin recorded during 1937 together with the normal and departure therefrom :—

	1937	*Normal*	*Departure*
Earthquakes ...	21	27	—6
Tremors ...	348	317	+31

V. Prosecutions.

(a) In connection with thefts, etc., of Mining Materials.

The following statement shows the number of cases dealt with during the year 1937 by the Special First Class Magistrate, Kolar Gold Field, in connection with the theft and illegal possession of mining materials under Section 6 of the Mysore Mines Act, as compared with 1936 :—

Year	Number of cases	Number of persons put up	Number of persons convicted	Value of property recovered
				Rs. a. p.
1937	48	70	49	652 11 3
1936	53	89	60	946 11 0

The following table shows the various kinds of mining materials in respect of which prosecutions were instituted during the year 1937 :—

Kind of material	Number of offences dealt with	Number of persons charged	Number of convictions	Value of property recovered
				Rs. a. p.
Gold Quartz	28	36	25	102 10 10
Auriferous Tailings	4	5	5	5 6 6
Amalgam	9	16	15	17 4 11
Sponge Gold	5	10	2	489 13 0
Unwrought Bar Gold	1	1	1	7 8 0
Explosives	...	...	...	...
Tools	1	2	1	30 0 0
Total ...	48	70	49	652 11 3

(b) In connection with breach of Rules, Accidents, etc.

The following is a comparative statement for the years 1937, 1936 and 1935:—

	1937	1936	1935
Number of cases	30	45	23
Number of persons put up	41	52	28
Number of persons convicted	39	41	27
Number of persons acquitted	...	8	...
Number of persons discharged	2	3	1
Number of persons not found	...	...	...
Number of cases pending	...	..	...

All the above cases were put up under the Mysore Mines Act IV of 1906. The penalties in the case of convictions ranged from fines of Re. 1 to Rs. 25 and imprisonment for periods varying from 1 month to 3 months.

During the year, nine persons were prosecuted for breaches of Mysore Mines Act and Rules framed thereunder, resulting in accidents. Except in one case in which the accused absconded, all the rest were convicted.

Less serious offences committed in connection with 23 accidents entailed departmental punishment of 26 persons who were either fined or had their certificates suspended.

Similarly, 33 persons were dealt with departmentally for offences not resulting in accidents.